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BLACK QUARTER.

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Black quarter is a disease which is also known by the names "black leg," "quarter ill," and "symptomatic anthrax." It is caused by bacilli, which multiply locally, or, in some cases also in the interior of the body. The multiplication of these germs leads to extensive alterations of the parts affected, and is accompanied by the formation of gas which distends the tissues and causes a crackling sound when the swellings are pressed upon. The disease is usually fatal in its results.

GENERAL CHARACTERS AND CAUSE.

Black quarter has until recent years been described as of the same nature as anthrax and was considered to be a form of that disease. For this reason it is still referred to by some writers as symptomatic anthrax. It has been known, however, for a long time that it does not spread by contagion, and that the meat of affected animals might be consumed by man or by carnivorous animals without causing the appearance of the disease in man. This fact indicated a great difference between black quarter and anthrax, as the latter is deadly to man or animals which consume the meat from affected carcasses. Observations and experiments made by Walraff in 1856, Pfisterer in 1870, Feser in 1860 and 1875, and still later by Bollinger, Arloing, Cornevin, and Thomas, and Kitt and Kitasato, have clearly established the characters and nature of the disease.

It has been shown that black quarter is a bacterial disease of cattle which is enzootic in certain districts where it remains and affects animals year after year. Its existence appears to depend considerably upon the character of the soil. There are stables and pastures in some sections of the world, particularly in the Alps, where this disease occurs during the whole year, but it is seen principally during the warm season of summer and fall. It is most common on swampy or wet lands or those which contain a large proportion of organic matter.

*NOTE.—Reprint of pp. 84-87 of Tenth and Eleventh Annual Reports of the Bureau of Animal Industry.

It most commonly affects cattle from 1 to 2 years old, and is usually confined to those from 6 months to 4 years old, although in rare cases it may affect calves or old cattle. Calves are less susceptible than older animals, as has been shown by experimental inoculation, which partly accounts for their freedom from the affection, but while feeding upon milk they are less exposed to the contagion than when grazing. Both factors, therefore, operate for their protection.

The old cattle which have been raised in a region infected with black quarter are supposed to be immune because they have had a mild attack of the disease during their growth and they in that way become insusceptible. It is known that one attack confers immunity in every case.

The disease is easily inoculated with cattle and sheep, and to a less extent with goats. Sheep and goats are said to contract the disease spontaneously, as well as cattle. Guinea pigs are very susceptible. When horses, asses, and white rats are inoculated the only result is a local swelling, which in time disappears. Some animals enjoy a natural immunity from this contagion, and inoculation with them produces no results. Among these may be mentioned swine, dogs, cats, rabbits and black rats. Man is also unaffected by this bacillus. There appears to be some doubt as to whether horses contract this disease, although recently one or two observations have been recorded which indicate that the horse is sometimes affected.

The bacillus of black quarter is anaerobic; that is, it is unable to multiply in the presence of oxygen. When in the soil where it does not come in contact with the air, or in the tissues of an animal, or in culture liquids, protected from oxygen, it develops rapidly, and produces considerable quantities of gas. The germs are motile in liquids, and have at one of their extremities a spore which causes an enlarged end. They are found in abundance in affected tissues, the bile, and the intestinal contents. They are seldom found in the blood, and inoculations made with this liquid usually produce no effect.

On account of the formation of spores in the bacilli the contagion has great powers of resistance and is preserved for a long time under the various atmospheric conditions to which it is likely to be subjected.

The strongest disinfectants are required to insure the destruction of the germs. For this purpose bichloride of mercury (corrosive sublimate), one part to a thousand of water, or a 5 per cent solution of carbolic acid may be used. It should be remembered, however, that these solutions, particularly the former, are very poisonous, and care must be observed to prevent injury to people or to animals.

It is supposed that animals are always infected through sores or wounds of the skin or mucous membranes. These injuries must be deep enough to reach the connective tissue or these bacilli are unable to multiply. In the skin and mucous membranes there is too much oxygen to allow their growth, but when they reach the connective tissue beneath these organs they find a situation that is favorable. Animals, therefore, appear to be infected through wounds received in pastures, either by stubbles or briars which break the skin of the limbs or by hard and sharp substances which puncture the mucous membrane of the month during mastication. These injuries become infected by earth or dust containing the germs coming in contact with them. The symptoms of the disease appear in from one to five days after infection, the average being about two days.

SYMPTOMS.

Black quarter is characterized by both local and general symptoms. The general symptoms are those of fever. Locally there appears a tumor, which is at first a small, warm, and tender swelling that extends rapidly and may cover a large surface of the body, and which, when lightly pressed upon, gives out a crackling or crepitating sound, due to the gas which it contains. For the same reason it is resonant on percussion.

Following the development of the swelling there also appears a secondary enlargement of the nearest lymphatic glands. If the muscles of one of the limbs are affected, which is usually the case, there is more or less lameness, according to the location of the tumor. The disease progresses rapidly and generally terminates fatally in from twenty-four hours to three days.

The swelling due to the local multiplication of the germs of this disease may appear in various parts of the body, most frequently on the thigh, the neck, the loin, or the croup. It is never seen below the knee or the hock. Very soon the central portion becomes cold, insensible, and the skin over it is dry and gangrenous. If cut into at this time very little pain is caused, and there escapes a dark-red, frothy liquid, which has a peculiar unpleasant odor. Usually but one tumor appears. Sometimes, however, several develop, which may by their enlargement become united into one.

The most prominent of the general symptoms are sudden loss of appetite, suspension of rumination, with great prostration, weakness, and high temperature of the body. The lameness may vary from a slight irregularity in the walk to complete paralysis of the limb. As the disease progresses there is trembling of the muscles and difficulty of breathing. Occasionally there are violent colics.

APPEARANCE AFTER DEATH.

The skin over the swelling is affected with dry gangrene. The connective tissue beneath the skin is infiltrated with blood and bloody serum, and is distended with gas. The affected muscles are dark brown or black, they are easily torn, and the spaces surrounding them are filled with bloody liquid and gas. The color is deepest at the center, shading off toward the edges; when opened the color becomes brighter by contact with the air. By compression thick blood escapes, which is charged with gas and has a disagreeable odor. The gas of the tumor is combustible and burns with a blue flame, being, according to Bollinger, carbureted hydrogen. The abdominal cavity sometimes contains a considerable quantity of bloody effusion. The mucous membrane of the intestines may be congested or inflamed and the contents of the bowels covered with blood. The liver is congested, but the spleen is usually normal. The flesh decomposes rapidly, and the carcass is soon greatly swollen by the accumulation of gas under the skin and in the body cavities.

It is sometimes desirable to determine whether an animal is affected with black quarter or with an anthrax tumor, or with a swelling caused by the bacillus of malignant edema. The anthrax tumor may be distinguished by the hardness and solidity of the tumor, and the fact that it contains no gas. The spleen is enlarged in anthrax, and is unaffected in black quarter. It is difficult to distinguish between the swelling of

black quarter and malignant œdema. They resemble each other very closely, and both are distended with gas. Malignant œdema generally starts from a wound of considerable size. It often follows surgical operations, and does not usually follow from the small abrasions and pricks to which animals are subjected in pastures.

TREATMENT.

As this disease is usually contracted on infected pastures, the cattle should be changed to other parts of the farm when it appears among them.*

The carcasses of those that die should be either burned or deeply buried and covered with fresh lime in order to hasten their destruction.

The stables in which sick animals have been kept should be thoroughly disinfected. To accomplish this they should be cleaned as thoroughly as possible with the ordinary stable implements, and then scrubbed with a 5 per cent solution of carbolic acid; afterwards the walls should be whitewashed.

The treatment of diseased animals usually has little effect and nearly all die. When attempted, the most promising measures are, first, to make large incisions into the tumors to allow the liquids to escape, and then to treat the wounds with a solution of carbolic acid. Internally give spirits of turpentine in doses of 1 to 2 ounces. This should be shaken up with oil or beaten up with eggs in order to protect the mucous membrane of the mouth and throat from its irritating effects.

As the animals in the best condition are most susceptible to this disease, attempts at prevention have been made with considerable success by reducing the condition of the animal in various ways. When the disease breaks out among a lot of young cattle some owners bleed all those which remain well, and repeat this bleeding two or three times. Others put a seton in the dewlap, which sets up a discharge and in that way reduces the condition. Still others give diuretics and laxatives to reach the same result. The remedies most frequently given are nitrate of potash, sulphate of soda, epsom salts, sulphur, and lime. A mixture much used in the West, and which is usually successful, is composed of 10 pounds of sulphur, 6 pounds of copperas, 3 pounds of saltpeter, and 3 pounds of air-slaked lime. Pulverize and mix and use in the salt trough in the proportion of a pint of mixture to a gallon of salt.

Vaccination as a preventive has of late years been adopted in many countries and appears to be quite successful. The vaccine is prepared by drying pieces of the muscle taken from the tumor of an affected animal and afterwards heating it for a definite time at a temperature of from 85 to 100 degrees C., according to the strength of the vaccine required. The dry vaccine may be preserved for a long time, and before being used is mixed with water and filtered. It is then injected under the skin of the tail with a hypodermic syringe. The dose and operation vary somewhat, according to the preparation used, and full directions should consequently be obtained from the manufacturers before any cattle are vaccinated.

* Pastures have been known to produce the disease year after year until plowed up and tilled for several years, after which no further cases occurred when the land was sown to grass.